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The JOURNAL of GEOGRAPHY

A Monthly Magazine Devoted to the Interests of Teachers of Geography in Elementary, Secondary, and Normal Schools.

RAY HUGHES WHITBECK, *Editor* LAWRENCE MARTIN, *Associate Editor*
Of the Department of Geology and Geography at the University of Wisconsin

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V. C. FINCH, Business Manager

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Volume XIV JUNE 1916 Number 10

THE WEATHER FACTOR IN THE GREAT WAR: IV

October, 1915,—February, 1916*

By Robert De C. Ward
Harvard University

Western War Zone

ON the western front the situation has remained practically *in statu quo*. The "see-saw" of military operations in relation to the changeable autumnal and winter weather of western Europe is the most striking fact. Clear weather favored artillery action and aeroplane activity; rain and fog made gun-fire difficult or impossible; mud checked the movements of artillery and of troops. Violent storms and snow, especially in the Vosges, frequently resulted in complete suspension of all military operations. During the French and British "drive" in Champagne and Artois in September and October, advantage was taken by the French of a heavy fog for making one of their attacks. The whole battle-line was in a "grayish mist." The generals and staff officers could not see the troops. A chilling autumn rain and "hailstorm" (doubtless "frozen rain"), followed by falling temperature, brought discomfort to the fighting and added suffering to the wounded. The ground was soft, owing to the rains, and the men were able to "dig themselves in" without difficulty. The interruption of the dull and thick weather by "brilliant sunshine and a cloudless blue sky," good for artillery observations, is noted in the despatches.

Snow "completely stopped" operations along the Anglo-French front at the end of November. The opposing forces, a mile apart, could not see each other's positions. With the coming on of winter (December) the reports of stormy weather became more numerous. A characteristic despatch (Dec. 4) read: "Stormy, rainy, and generally unfavorable weather interfered with active operations." Early in December, floods in the Yser region forced the Germans to abandon some of their advanced trenches. In mid-December continuous rains, floods, and deep mud made fighting on a large scale impossible. Roads were in many places under water. *Le Temps*, on Dec. 26, reported "the wind is blowing from the east, which will permit the enemy to use asphyxiating gases. It is, then, the most elementary prudence for us to be ready with masks, and to man the batteries." This is a significant statement: a forecast of a probable hostile attack because the wind was favorable for the

*Previous articles in this series have been published as follows: *Popular Science Monthly*, Vol. 85, Dec., 1914, 604-613; this *Journal*, Vol. 13, Feb. Mar., 1915, 169-171, 209-216; Vol. 14, Nov., 1915, 71-76. The date of closing the present paper was Mar. 1, 1916.

use of gas. Several cases were reported from this western war zone of the influence of wind. In September, a fire set by hostile projectiles within the French lines was driven back by the wind into the German lines, and caused "perceptible damage." During the Allies' big October drive the wind was noted as favorable for their use of gas, i. e., it must have been a westerly wind, of no great velocity. On Feb. 12, in Champagne, a change of wind rendered inaffective a large quantity of asphyxiating gas which had been relied upon by the Germans for enabling them to make a successful attack. In January (13th), also, the wind shifted while the Germans were using gas, and drove the fumes back into their own trenches. The very few reports of such occurrences during the war show how accurately the Germans have been able to forecast the wind before they have attempted their gas attacks. Early in February French artillery fire wrecked some German gas reservoirs in Champagne and the wind, being from the west, carried the gases over the enemy lines.

In mid-February widespread severe gales caused shipwrecks, interruption of Channel steamship service, and of telegraphic communication. The weather conditions along the war front were reported as the "worst since the war began," particularly in Belgium. The "terrible gale" made artillery fire very difficult.

It was to be expected that no general advance, on either side, would be made until the winter storms became less frequent and less severe, and the approach of more settled spring weather dried up the muddy and slippery ground. As between the French and the Russian fronts, weather conditions would naturally be more favorable in the former case. It was, therefore, no surprise to receive the news of the great German drive in the Verdun region, during the last days of February. It was early in the season for a "spring drive," but the Germans were doubtless making an early start in order to anticipate the expected "spring drive" of the Allies, and were perhaps influenced by favorable weather conditions which looked like a premature spring. The heavy German artillery had previously, according to Berlin despatches, been brought up with great difficulty owing to the bad weather and the condition of the roads. A blinding snowstorm (described as a "blizzard") developed soon after the "drive" began (Feb. 24-25), but did not stop the progress of the battle as a whole. At some points along the front where the snowfall was heavier, as east of the Meuse, a noticeable slackening of military operations apparently occurred. The snow was almost less of a handicap than the thaw which followed, making the clayey soil spongy and slippery, checking the German advance, and causing a temporary lull in the fighting. A Paris despatch notes that the Germans "seemed to welcome the blizzard as giving possible protection from the seventy-fives." Gas was used, but the wind was variable, and covered those who used it, as well as the enemy.* French am-

*This record closed with Feb. 29, when a crisis around Verdun had not been reached.

bulance men who went out to rescue wounded Germans found many of them frozen stiff.

In regard to the comfort of the troops during the winter, it is clear that far better preparations in the way of warm clothing, blankets, and other supplies were made than was the case a year ago. In spite of all precautions, however, there was much suffering on account of the icy water and melting snow in which the men had to stand and live in the trenches, with many cases of frozen feet. A sledge ambulance section was provided for transporting the wounded French troops who had been fighting among the snowy heights of the Vosges. It is worth noting that Germany stopped the exportation of snowshoes on Nov. 30.

The Eastern War Zone

Weather has played an important part in the general plan of campaign as well as in the day to day operations on the eastern front. Unusual activity on the part of the Germans at the end of September was probably due to their desire to reach the line where they had planned to establish themselves for the winter. The question, how far to penetrate into the domain of Russia's "hitherto unconquered generals, January and February," was doubtless one of the most critical which the German military staff had to settle. The autumnal rains, and the resulting floods and swampy ground, proved very embarrassing to the Germans. The general German campaign against Russia obviously failed of its purpose. The Teutonic troops did not reach the northern seaboard towns which they set out to capture. The Czar's armies were not forced to their knees, and the Germans did not succeed in reaching a strong line on which to entrench for the winter. The "weather, the Cossacks and the quagmires" proved to be a more formidable obstacle than had been anticipated. On Oct. 26 Petrograd reported snow as falling, and the winter as setting in early.

The German preparations for the winter campaign were remarkable. Among these preparations are noted steam-heated, concrete-lined bombproof shelters; winter clothing and sleeping bags; alcohol to be used for daily rubbing of the body; white calico and linen to serve as protective covers for uniforms, trenches and supply wagons; "boring squads," to bore into the frozen ground, insert explosives, and thus make trench-digging easier. In spite of all these preparations against the conqueror of Napoleon—the Russian "General Winter"—many of the German troops were unable to dig themselves in, and had to spend the winter virtually on the surface. Whenever snow fell the movement of artillery and transport wagons of all kinds was hampered. On the other hand, as winter's cold froze the ground and the marshes, Russian activity was renewed all along the front. Thawing weather suspended all military operations; freezing weather stimulated them. A rapid thaw at the end of January in the Pinsk marshes (Petrograd despatch) resulted in the "engulfing of enormous quantities of German caissons, munitions and guns,"

and in the loss of many men who were unable to extricate themselves from the "marshy labyrinth." Mild weather threatened the German trenches, dug on marshy ground, and seriously handicapped the German advance. The Russians confidently looked forward to the spring thaws as certain to make the German trenches along the northern front untenable.

The whole "marsh campaign," if we may so term it, has been of extraordinary interest. As long as the marshes were not frozen—and they seem to have been "open" much of the winter—no extraordinary fortifications were needed. It was a clear case of "stationary warfare." Neither side could well advance. Plank bridges were laid by the Germans from hummock to hummock and from trench to trench; block-houses, built on piles, stood up above the water or ice; miles upon miles of barbed wire entanglements zigzagged across the ice or were half submerged in the water; dynamite was used to break up the ice, and make it harder for the Russians to advance; sledges dragged provisions and ammunition where there was ice, and rafts and boats were used where the water was open. The warfare was a straggling guerilla warfare, over the ice and through the swamps. The hospital cases were mostly frostbites and "colds." And all through those great swamps are lying bodies of dead Germans and dead Russians, who were shot and disappeared in the dark waters; or fell through the thin ice, or lost their way and were drowned.

Never in all her history has Russia's ice-ring been as serious a handicap to her as in this Great War. Last winter, while Archangel was frozen up, about one-third of the munitions, provisions and other supplies came in by way of Vladivostock, whose harbor must be kept open by means of ice-breakers, and about one-third came from Saloniki, through the Balkan states. This winter the latter route has been closed. No wonder, then, that desperate efforts were made to keep open the harbor of Archangel. Ice-breakers were brought from Canada. Ice-breakers were built in England. And those that were available were put to work to prevent, or at least to delay as long as possible, the winter ice blockade of that lonely northern port. Navigation usually closes by December. This year the reports regarding the conditions of navigation there have been contradictory. U. S. Consul Winship, at Petrograd, reported under date of Dec. 30, that there was a shortage of ice-breakers at Archangel, and that the harbor was so heavily ice-blocked that steamers had great difficulty in getting out. It was then expected that the season of navigation would shortly close, until late spring. Last year the closed season lasted from December to April. In order to handle the immense amount of freight which has been coming through Archangel since the war began, a new double-track railroad is reported to have been built, to replace the old single-track narrow-gauge line.

Much has appeared in our press despatches concerning Russia's new ice-free port, Ekaterina (Alexandrovsk), and the new railroad line to it. This port is on the Murman coast of the Kola Peninsula, which forms an eastern

continuation of the larger Scandinavian peninsula and nearly encloses the White Sea on the north. A naval station was established here in 1899. Ekaterina Harbor is a good deal farther north than Archangel—it is over 150 miles north of the Arctic Circle while Archangel is over 100 miles south of the Circle. But while the latter port is ice-bound, Ekaterina is exposed to the warming influence of a branch of the Gulf Stream drift which follows closely along the coast, and the harbor is never frozen. The White Sea is out of the reach of this warm water. Hence Archangel is frozen. Russia thus has what she has so long needed—and never more than now—an ice-free port, nearly 500 miles nearer the Atlantic than Archangel is. The new railroad has been completely surveyed, and thousands of men were employed on its construction last summer, many of them Austrian and German prisoners of war. Pending the completion of the line, communication with Archangel has been established across the ice of the White Sea by means of sledges and motor trucks to the part of the railroad which is already in operation. In 1899 Count Witte had plans drawn for a railroad from Petrograd to Ekaterina Harbor, but it was not until the present war showed the urgent need of such a port that construction was really begun. American engineers and skilled laborers were imported from the United States to work on this railroad. A despatch from London, Dec. 29, mentions the voyage, "under the most favorable conditions," of the Norwegian S. S. "Kong Helge" from Tromsoe (Norway) to Ekaterina Harbor, with a cargo of English and American machinery.

The *Berliner Tageblatt,* in September, made the statement that "winter is at the door, winter and the freezing of the White Sea, and the increasing difficulty of transporting American munitions through Siberia. It is not going too far, therefore, to say that Russian assistance is out of the question for the Entente for a long time to come." In the light of what Russia has been able to do, this prediction is seen to have been singularly mistaken.

The Austro-Italian War Zone

The meteorological handicaps have been severe in the mountainous country where the fighting between Italian and Austrian troops has been going on in the clouds, and amidst the glaciers and the snows of the Alps. No other part of the Great War has been fought out for so many months under equal conditions of hardship. Snowshoes and skis were provided for the troops to enable them to march and climb over the deep snows. Extra-heavy winter clothing and foot warmers were provided. The provisions were assembled in specially constructed weather-proof huts. The shelters for the men were supplied with stoves. It has been a long monotonous struggle—without appreciable and permanent gains on either side—against snow, and fog, and storm, and cold; with intervening spells of more favorable weather when military operations were stimulated. To follow the details of this campaign would be

tedious. Advantage was often taken of fogs and of snowstorms for making surprise attacks. Thus, on the night of Feb. 23-24, on Mount Santa Marta, an Austrian detachment, clothed in white, and advancing toward the Italian position during a snowstorm, was seen and repulsed. Many of the soldiers, fighting against the severity of the Alpine winter, were invalided home with hands and feet frost-bitten. To supply their troops with warm clothing, offices were opened by the women in the principal Italian cities, where furs of all kinds were brought in to be made into winter garments. The troops fighting in the region towards Trieste have found themselves in much more favorable weather conditions. Here, on the Carso plateau, in late summer and early fall, the men suffered from the heat, even in their light grey cotton uniforms. During the late autumn and winter the general cold-season rainstorms of that region have often interfered with military operations. Air raids have been numerous in this zone, in spite of fog.

The Balkan Campaign

The "military expert" who, early in October, prophesied that "a winter campaign of no small importance may be fought out in this warmer southern region" was right in his forecast as to the importance of the winter fighting in the Balkans, but was obviously ignorant of the severity of the cold-season weather conditions of that rugged district. The winters of the central and eastern Balkan countries are not very unlike those of eastern Germany. The snows lie deep on the mountains and in the passes. The cold is severe, often below zero (Fahr.) On the western coast, and in the south, milder winter climates prevail. The winters are cool rather than cold, and much like those of southern France. The rainfall along the Adriatic coast is heavy throughout the year, especially in autumn.

The Serbian campaign was carried out under great stress of weather. Early in the Teutonic invasion (Oct. 18) the autumnal rains and cold weather greatly impeded the movements of the guns and troops of the invading armies, and delayed the arrival of enemy reinforcements. In one despatch it was reported that "mud is to the Serbians what snow is to the Russians. Before today, Serbian mud has helped to delay the enemy and been a valuable auxiliary." The Teutonic advance "necessitated great exertions" because of the heavy rains, snows, and deep mud, and was inevitably very slow. This was a help to the retreating Serbians, but the mud also operated to prevent the arrival of the much-needed French and British reinforcements. "Terrible snowstorms" in mid-November made all operations very difficult. The difficulties under which the Germans were laboring late in November gave hope to the Entente allies, yet, as one German despatch put it: "Neither impenetrable roads, impassable mountains thickly snow-clad, nor the absence of reinforcements and shelter, were able to check our advance" (Nov. 29). Snow was reported at Saloniki at the end of November, and was taken by the natives as a sign of a severe winter. "Bitter weather," "heavy and continuous snowstorms, reaching the proportions of a blizzard," were reported. "Unquestionably, the weather is a material factor in the fighting," an Athens despatch

(Nov. 30) said, "and has had the effect of delaying the pursuit of the Serbian army in its trek into Albania." The sufferings of the Serbian refugees, including large numbers of aged persons, of women, and of children, were terrible. Struggling over rough roads, through cold and deep snow and rain, without sufficient food or clothing; dying, doubtless by thousands, of cold and hunger,—the story is one of the most tragic incidents of this terrible war. Fires could seldom be made, owing to the lack of wood. Vehicles and guns had to be abandoned, and many of the refugees were barefooted in the snow. A slight retirement of the French troops early in December was made necessary in order that winter quarters "less exposed to the inclemencies of the weather" might be reached. This retirement was facilitated by the delays experienced by the Bulgarian troops, owing to the snow and the state of the roads. At Saloniki the Allied troops suffered from the "damp and penetrating cold." Firewood was scarce. The most frequent cause of disability among the French soldiers who fought in the Serbian campaign, was frozen feet, necessitating many amputations. A concentration of German and Bulgarian troops at Monastir (Jan. 24), where shelter against the winter weather could be found, led the French to make an air raid to that city. The weather during the raid was fine, but the wind boisterous, from the north.

The Dardanelles Campaign

The Dardanelles campaign ended—at least for the time being—with the evacuation of the Gallipoli Peninsula by the English troops. Towards the end of the summer, in the dry season of that sub-tropical region, suffering from thirst was to be expected, yet the British military authorities seem to have made little provision for a water supply. The weather was hot, and the men suffered for want of water. Delays in the disembarkation and in the advance of the troops were occasioned by the necessity of first disembarking the mules for carrying water. A large reservoir, holding 30,000 gallons, with distributing pipes, was later built in the Anzac region. Old oil tins were also provided, and fitted with handles, to serve for carrying water to the men. Early in August Gen. Sir Ian Hamilton reported that "water troubles" prevented his carrying out his plans. All ranks (Aug. 10) were reduced to one pint a day. When the mules carrying the water-bags arrived at the front, "the men would rush up to them in swarms just to lick the moisture that exuded through the canvas."

Early in October one of our "military experts" observed that there were "still three months of good weather ahead for any new move" in the Dardanelles. His familiarity with the climatic conditions of the region was not to be depended on. On Dec. 7 Gen. Sir Ian Hamilton reported: "I regret to say that the measures actually taken for distribution (of water) proved to be inadequate, and suffering and disorganization ensued." The distribution of water from the landing-places did not work smoothly. The soldiers cut the hose in order to fill their water bottles, and some of the lighters grounded so

far from the beach that the men had to swim out to them for water. The Suvla Bay landing failed in its object, largely, without doubt, through the failure of the water supply. The sufferings of the troops on this account make painful reading. A Sydney (New South Wales) despatch, dated Dec. 15, noted the interesting fact that the Australians on the Gallipoli Peninsula, most of whom had never seen a snowstorm, had their first experience of the sort on Nov. 27. A "fierce and bitterly cold" northeast wind blew that night, with drizzling rain turning into snow. The next morning the men woke up to find the country covered with snow, and the snow still falling. This snowstorm, described as a "blizzard" and as being "a month before the ordinary date of such conditions in Gallipoli," caught the troops unprepared, with insufficient shelter and clothing. There was much suffering from the cold, and in the wet snow. The night of Nov. 28 brought a sharp, cold wind, with more snow, and the ground froze. This weather lasted for some time, during which the Quartermaster's Department was able to supply waterproof capes and rubber boots to some of the men. The Turks, also, seem to have been caught unprepared, and had to evacuate some of their trenches. Early in December the usual subtropical winter storms made it difficult to bring up provisions, and the continued lack of drinking water began to tell upon the condition of the men (Berlin report).

The final evacuation of the Peninsula was aided by a fog, which "fortunately hung low over the surface of the sea," but a gale during part of the time (reported as 35 miles an hour) made it difficult to use piers and lighters. Nevertheless, in spite of all obstacles, the British troops were all safely embarked, and the ill-planned and unsuccessful Gallipoli expedition came to an end.

The Caucasian Campaign

In their Caucasian campaign the Russians met very severe winter weather, yet neither intense cold (—20° to —25°F.), nor deep and blinding snowstorms, nor bad roads in a rugged mountainous country, at high altitudes, seem seriously to have delayed their progress. As far back as early December, snow, described as "ten feet deep," and "cyclones," which doubtless means gales accompanying the snowfall, hampered operations. In mid-January the Russians successfully fought the Turkish troops during severe snowstorms, "above the clouds," where trenches had to be dug in deep snow. The pursuit continued in spite of snowstorms and the absence of roads. The Russians advanced through deep snow ("up to their chests in snow"), across "almost inaccessible passes," in "intensely cold weather." The final operations around Erzerum, in February, were carried on under the most severe weather conditions, the snow being deep and the thermometer being reported as —30° F. The Russians have always been known as good cold weather fighters. They have maintained their reputation during the present war.

The Mesopotamian Campaign

When the British expedition invaded Mesopotamia from the Persian Gulf, a new climatic district was added to the war zone,—one in which the weather types differ markedly from those which characterize any other portion of the war area except that in Arabia and Egypt. Mesopotamia is a country of aridity; of intense summer heat; of deserts and steppes; of mild winters, and of cold-season rains. In some of these respects it has a good deal in common with the Mediterranean countries, but its rainfall is less,—and its summer heat greater. The winter months bring the rainy season, but the total mean annual rainfall is only about 8 inches, and some years give but half as much. More rain falls on the mountains than on the arid lowlands. The Tigris and Euphrates floods come generally in late winter or spring. The highest summer temperatures average between 115° and 122°; in individual cases they even run a few degrees higher. During the excessive heat the natives take refuge, during the day time, in underground dwellings in which the temperatures may be 10°—25° lower than outdoors.

It will be remembered that Gen. Townshend's column, proceeding up the Tigris, captured the historic city of Ctesiphon, but partly because of lack of water was obliged to retire to the river when within a short distance (about 20 miles) of Bagdad. The reports mention marches "over burning sands"; intense suffering from thrist; temperatures of 128° to 130°,—the latter readings doubtless too high for the time of year. It was necessary to keep the army near the river, where there was a plentiful supply of water. An officer in the Royal Field Artillery wrote of temperatures of 110°; and of the exhaustion of the infantry in the very hot sun. "We cannot carry nearly enough water," he notes, "and one's tongue soon swells when the sun is up." The heat was "about the limit of human endurance." The men fell ill as a result of the excessive heat and of the bad water. The temperature in the hospital tents was reported as 130°, and this may easily have been the case. Under such conditions "the suffering of the wounded and sick was distressing to contemplate." On an afternoon march this same officer's goggles were so hot that they blistered his face, even under the shade of his helmet.

The relief expedition under Gen. Aylmer, going to the relief of the beleagured troops in Kut-el-Amara (January) met with serious difficulties on account of the rains. A London despatch (Jan. 22) mentions a "hurricane," which had made navigation and other operations most difficult. The Tigris rose rapidly. "Atrocious weather"; "incessant rains"; floods and deep mud continued. On Jan. 24, it was reported that the Tigris had risen 7 feet in 48 hours at Kut, "preventing all troop movements by land." It was a hard struggle against both Turk and weather, without definite result. "At this season," one despatch noted, "the Tigris is very full, with a strong current," thus giving an advantage to the British army, which was provided with pontoons.

The Campaign Against the Suez Canal

Much has been said about the possible, or probable, invasion of Egypt by the Teutonic Allies, and many contradictory, not to say erroneous statements have found their way into print. Exactly what has actually been accomplished by the Germans in preparation for this anticipated invasion cannot be determined at the present writing. It has been reported that the Turks, with the assistance of German engineers, were "pushing a railroad toward Suez, over 150 miles of desert," and were paralleling it with a pipeline for water. These water-mains were to be laid from Bir-es-Seba, where there are wells, and the water was to be driven by powerful pumps. Openings were to be provided at convenient intervals to supply the troops during the march. During the Turkish advance, some months ago, across this same desert, water was carried on the backs of camels and donkeys.

With the known climatic handicaps of the desert clearly in mind, there is nothing inherently impossible in the construction of such a railroad and in providing water, by means of tank cars or pipe line, and food. There is a report that German engineers were prospecting for water all through this region as far back as 1912. In the case of this proposed invasion, the greatest difficulties would pretty surely be encountered in the transportation, feeding and munitioning of the troops over such very inferior railways as those of Asia Minor. As to the water-supply available for a large army during its progress across the desert it is, of course, impossible to make definite statements. At the eastern end of the Mediterranean the rainfall along the coast averages somewhat over 20 inches a year, but the amount decreases to the south and west, so that even on the coast in the country which would have to be crossed by an invading army less than 10 inches fall annually. This is a winter rainfall. Hence winter would be the best season for such a campaign, both on account of the better water supply and of the lower temperatures. Yet the seasonal and annual rainfall is subject to great fluctuations, and cannot be predicted in advance. The supply is variable, and precarious, especially when the needs of the transport animals, as well as of the men, are taken into account. The climatic obstacles are not insuperable, but they are serious. To transport a large body of troops for 1500 to 2000 miles, probably exposed near the coast to the fire of British war vessels, to a fighting ground in the midst of a desert, facing the British troops with Egypt close at their backs, presents a problem which even the highly efficient German military staff might well hesitate to solve. We learn that the Germans have considered the use of air-cooled motors for moving artillery and supplies in the desert, in order to reduce the water requirements of the many transport animals which would otherwise be needed. In spite of its many disadvantages, a desert does possess one great advantage from the point of view of health. Its air is dry, and aseptic. Under any ordinary conditions of proper sanitation widespread epidemic diseases would not be likely to occur.

The War In Africa

From the widely-extended war zone in Africa but little detailed information has reached us, although great changes in political boundaries have taken place there. Late in November it was reported that with the beginning of the dry season there had come a renewal of activity on the part of the forces operating against the Germans in Kamerun. During the rainy season, great difficulties had been encountered in the movement of troops and supplies. About Christmas time a Cape Town despatch mentioned the sufferings of the Central African Imperial Contingent in its march against German East Africa, through Nyassaland. The heat was "terrific." The men wore "mosquito boots" reaching almost to their knees; gauntlets up to their elbows, and veils over their faces. The contrast between the abundance of streams in this region and the aridity of German Southwest Africa was a welcome one to the men who had previously campaigned in the latter district. The regime enforced by the medical corps was very strict. The men wore special caps under their helmets, to protect the top of the spine; they were warned against bathing in the afternoon, and had explicit orders to protect themselves against evening chills. It is a curious fact that the evening and night chill of the Tropics is one of the greatest dangers to health there. Gen. Wolseley is reported to have said of the Tropics, "not to get cold is to avoid almost certainly all the causes of disease."

The War In The Air

The war in the air has continued to show marked controls of weather, similar to those noted in the previous articles of this series. Some of the essential facts determining Zeppelin raids on England were clearly indicated by a member of a Zeppelin crew at the end of September. "Unfortunately," said this German, "the weather is the best ally of the English. Either there is no wind, or it is too windy. The beginning of the month of September was ideal. Cold nights set in, with a steady east wind. If we can get a steady east wind, and can float a considerable distance, thus conserving our petrol, London is within range." The Zeppelin raid at the end of September was favored by clouds, which concealed the air-ships. Aeroplanes of the Royal Flying Corps were unable, owing to a fog, to overhaul a Zeppelin which raided London about the middle of October. A German aeroplane took advantage of a bright moonlight night (Jan. 23) to drop bombs on the Kentish coast. Another raid, soon after, was interfered with by a "thick mist," so that bombs could not be dropped with accuracy.

A German air attack on Paris on the night of Jan. 29-30 showed that the French capitol was not immune from such invasions. The French explanation of the German success was that a fog prevented the French aeroplanes from damaging the Zeppelins by means of gun-fire. An Amsterdam despatch (Feb. 3) reported a Zeppelin flying low over a Dutch island, the aviator having lost his bearings in a fog. The Dutch guards bombarded the

air ship because of its violation of neutrality laws. In the last week of February, a Zeppelin which was trying to steal across the French lines near Barle-Duc, at high speed, was so delayed by a head wind that the French defense had time to bring up guns and the Zeppelin was destroyed.

In regard to the liberation of asphyxiating gas, whose safe and effective use is impossible unless the wind is in the right direction and of the proper velocity, the Germans have been sending up kites in order that they may determine the probable wind direction beforehand, and govern themselves accordingly.

Protective Mimicry and Weather Controls

A closing paragraph may be added on a few of the instances of protective coloring, employed during the war, in which the control of climate and weather appears directly or indirectly. The field-gray uniform was adopted, after long practical tests with all colors and shades of color, because it can least easily be distinguished against the summer gray-green fields and the grayish fog. During the winter, white uniforms, or dark uniforms covered with white calico or other light material, have been used in Russia, in the Alps, in the Vosges, and elsewhere. Even the guns and wagons have been covered with white. In the North Sea, with its cloudy skies, the German fleet is painted light gray; England and Russia use a somewhat darker gray. The English and German torpedo boats are black, in order to make them inconspicuous at night, when they are most often used. Russia uses dark green for her Baltic torpedo boats and submarines. But in the Black Sea fleet the Russian battle-ships and cruisers are light gray, the torpedo boats dark gray, and the submarines light gray-green. The lighter shades are better for protective purposes in the sunnier latitudes of the Black Sea. The French fleet, mainly intended for use in the Atlantic, is bluish gray; the torpedo boats are dark gray, and the submarines bottle-green, "just the color often seen in the sea on a clear, still day, when looking over the side of the ship." In the sunnier tropics war ships are painted white and torpedo boats light gray or slate gray. Air-craft are generally painted gray, to match cloudy skies, but a new device is to cover them with a glassy transparent fabric, which makes them less visible when the sky is clear.

The foregoing facts on protective mimicry are taken from an interesting paper by Dr. Hans Gunther, in a recent number of *Die Umschau* (Berlin).

Owing to the great output of petroleum in California and its use as a manufacturing, railroad, and steamer fuel, the production of coal in Washington has been considerably reduced during recent years. It is estimated that the consumption of California oil for fuel on the Pacific Coast is equivalent to about 21,000,000 tons of coal, or between 6 and 7 times the output of coal in Washington, or for that matter in all the Pacific Coast States combined, in 1914.

THE SOD HOUSE AS A FORM OF SHELTER; WHERE? WHAT? WHY?*

By Louise W. Mears
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AS a form of shelter in the Great Plains, playing a part in the history of the development of the United States and representing a real response to nature, the sod house merits our study. The little "soddy," so undervalued by the uninitiated and so little known, is but a passing curiosity to the car-window observer who hurries across the monotonous Great Plains east of the contrasting rugged Rockies. Even less attractive may be the abandoned "soddy" standing in pathetic dejection near the railroad. Practically nothing of an informational nature has been written about the sod house, hundreds of which still exist to shelter families and school children in the United States and Canada.

A Response to Environment

The sod house, like the Eskimo igloo, is an immediate response to nature, telling a large geographical story. It differs from the igloo or the Bushman's straw hut in being a transitory form of shelter. It is overtaken by the modern frame house in much the same ratio that ranching is supplanted by agriculture. As an index to an important group of geographical conditions, it surpasses the log house and the dugout, which are found everywhere from the sub-arctic to the gulf, suggesting frontier conditions only, or an elementary standard of living, as with the negroes of the south. The facts will no doubt bear out the statement that the sod house, as a form of dwelling used by white men in the United States, is our most perfect type of primitive shelter which illustrates man's adaption to nature. This comparison does not include the Indian adobe house.

The geographical story suggested by the sod house may be resolved into the following problems:

1. Where are sod houses in use today? 2. Why? 3. How constructed? 4. What modifications appear in the original structure, and what do these changes indicate. 5. What change in related conditions has brought about a decrease in sod houses?

The Region of the Sod House

1. *Where?* It is in the Great Plains region of the United States chiefly that we find this interesting form of shelter, the sod house, constructed with such variations and modifications as the ingenious homesteader and the rancher can devise. By Great Plains we mean the western part of what people generally term the prairies, corresponding to those grass lands known in Asia as steppes, where treelessness is also due to "great extremes of climate,

*Copyright pending

produced by remoteness from the ocean." As Herbertson tells us in *Man and His Work,* "The Russian word steppes denotes unwooded tracts in middle latitudes, of considerable extent, and covered with useful vegetation. The victory (here) belongs to the grasses, which grow with incredible rapidity."

As to the line of demarcation between prairies and plains, Brigham gives the widely accepted view: "The hundredth meridian runs through the Dakotas, central Nebraska and western Kansas. It is not the exact climatic boundary, but it is nearest to it, and it is easy to remember that eastward more than twenty inches of rain falls in a year, crops are raised without artificial watering, and we call the land prairies. West of the line there is no sudden change either of climate or topography, but on the average the rainfall is less than twenty inches, and irrigation is needed, except in unusual seasons, or for crops that require but little water. When we cross the hundredth meridian going west, we begin to be three thousand feet or more above the sea. We have crossed a plateau which has a gentle slant to the east. There is a central belt of the Great Plains which is smoother than the rest. It runs through Nebraska and Kansas and into Texas, and has been distinguished as the High Plains. In this central area there is rain enough to allow the forming of a sod, which is firm enough to check erosion by rain and by small streams."

Nebraska is an unusually good state in which to observe the relation of the sod house to topography and climate. Here, because the regions of the High Plains, Sand Hills and Prairies overlap, we must not confine the area of the sod house too closely to the western sections of the plains states. For example, in central Nebraska, in the Sand Hills region, sod house dwellings and school houses are not uncommon. We have the statement on good authority that in one of these counties alone there are at present from seventy-five to one hundred sod houses. This statement has greater significance when we bear in mind the sparsity of population.

The Sand Hills region of Nebraska is, paradoxically speaking, a wet-dry country. The sandy surface is dry, and struggling streams are few, but just beneath the surface there is an abundance of ground water. The location of the ranchman's home can here be permanent. Neither is he compelled to erect windmills as in the sections where the water table is low. Condra, in his *Geography of Nebraska,* says: "There is little surface water in the Sand Hills region. For miles in the hills proper no stream-channels are seen. The streams are abundantly supplied by spring water, but with little or no storm water. The open-textured, sandy soil absorbs most of the rainfall. Though the amount of moisture evaporated from the soil is large, there is not as much loss in that way as some have thought, a surface mulch of sand preventing excess evaporation. Much of the rainfall percolates downward through the sand and becomes ground water. The water table is nearest the surface at a distance from the river valleys, rising and falling with the wet and dry years. The amount of ground water in the region is great, more than would be expected

with the rainfall. Capillary water is present in the sand a few inches below the surface, extending from this point to the water table below. Lakes are common, and wet weather ponds are more common than permanent lakes."

The "Why" of the Sod House

2. *Why* should houses be made of sod? It is often the only available building material. The treeless plains are the grass lands for the extensive cattle ranches. The house is likely to be built a long distance from towns or railroads. To turn the firm, deep sod with a plow is quick work. The sod house involves practically no expense. In fact, the expense can be reduced to the cost of window-glass. It is easily constructed, and resists both heat and cold. It is stable and durable. The scant rainfall and rapid evaporation leaves the building intact. But few persons would on first thought associate stability and durability with a sod house.

3. *How* is a sod house constructed? Nature furnishes the material at first hand. She also deals kindly with man's handiwork. The house is put together most simply. Sometimes, as in the case of a school house, all the neighborhood families gather and build it in one day. No framework need be erected before the sod is laid. Any tough sod convenient to the building is used, such as blue-stem grass or hay meadow grass cut from a moist, compact land, a mile or less away. Autumn is the preferred time, when the roots are tougher and thicker. A dry time is best for laying the sod, as the building settles less.

The sod is cut in blocks two feet or more in length, a foot or more wide and two to four inches thick. It is laid block upon block like brick, with the grass side down. The length of the block determines the thickness of the wall. It can easily be seen that window and door casings will be wide when set in a wall that is several feet thick. The frames for these are of lumber, and are in place when the walls are being built up.

The roof of the early sod house was of sod, where now shingles are often used. It is able to withstand the showers. From the "draws" or "canyons" the homesteader secures the long pine and the saplings. We are reminded that the local details of surface vary in the western plains. The steep-walled ravines are often known as canyons. In the billowy Sand Hills region there are the "pockets" and basins and the barren "blowouts." In western North Dakota the deep valleys, which often furnish protection to animals from the storms of winter, are sometimes known as coulees. As Ellen Churchill Semple says, "The more flat and featureless a lowland is, the more important become even the slightest surface irregularities. In the dead level of extensive plains even slight elevations are seized upon for special uses, or acquire peculiar significance."

The first settlers had reason to prize highly such timber as they could procure along the streams and in little depressions where water had stood. The ridge-pole for the roof of the "soddy" is usually the long pine. Along the middle of each side of the roof a second long pole extends parallel to the

ridge-pole. Rough slabs are laid across the poles. These may be covered with tar paper or straw before the sod is laid for the roof, grass side down. The sod may be laid double, the second layer covering the openings in the first. The pitch, or slant, of the roof is slight. And invariably the stove pipe extends through the roof. The American homesteader seems not to have made a success of roof thatching.

The Interior

Questions and grave misgivings arise in the mind of the reader as to the interior of the sod house. It is here that the ranchman shows his superior civilization. In speaking of the American grass lands, Herbertson says: "The steppes of North America have been occupied, chiefly in the last half century, by settlers of North European descent, who have established large cattle-ranches. These have not reverted to pastoral habits in returning to pastoral life. This is partly because they came of a race which had acquired different characteristics during centuries of settled life, and partly because the construction of railways has opened markets and removed the isolation of steppe life, where nothing could be procured from outside sources, and each group had to supply its needs from the materials at its command."

There is frequently the strange anomaly of the sod house with its interior furnishings including a library, piano, rugs and pictures. The owner of the house may be a college-bred man or the father of children who are attending the university. The walls are trimmed smooth inside with a sharp spade, and plastered with a native clay, "giving a smooth, tan colored wall as easy to keep free from vermin as a frame building would be." Often walls are kalsomined, papered or whitewashed. A thin muslin is usually tacked over the ceiling, and is easily taken down to be washed when necessary. Pegs are driven into the walls for hat and coat racks and supports for shelves, without which a sod house would not be complete. The house varies in size, containing as many rooms as are desired, a covered passage often joining two buildings. The floors, usually excavated several feet, are of earth.

Permanency

A well-build sod house may be occupied for ten, twenty or thirty years, with the sod roof renewed occasionally. Cool in summer and warm in winter, it furnishes secure shelter when the winds howl over the plains bearing the blinding blizzard or the grating sand. Flowers bloom in the deep window recesses the year around. Today many a family lives in the sod house as a matter of preference. In modified form, it is likely to remain in use for some time to come in the western counties of the Great Plains, where timber is scarce and transportation poor and towns are far apart. Dry farming and irrigation cannot encroach greatly upon the ranching country.

The spirit of independence that characterizes a people engaged in pastoral pursuits is strongly developed on the Great Plains. The view from each settler's home is boundless. This is the country over which Kit Carson and

Buffalo Bill rode in many a wild ride. Here is where Theodore Roosevelt lived a cowboy's life. Wholesome hospitality the traveler on the treeless plains may count upon. Near neighbors, ten or more miles apart, enjoy social gatherings. Railroads and automobiles are, however, rapidly removing the conditions that attend isolation, and the ranchman enjoys large opportunities.

Homestead Laws

Growing out of the necessity for extensive ranching grounds in the semi-arid portion of Nebraska, that is in the Sand Hills and High Plains, congress passed a homestead law known as the Kinkaid Act, in 1904. The experiment of trying to convert this region into farms had failed generally. The Kinkaid Act allowed the homesteader to make an entry for 640 acres of land, instead of 160 acres, as formerly. Thus the homesteader makes up in quantity of land for what the soil lacks in quality and productiveness. He must depend almost entirely upon grazing and stock raising. "The use of windmills may enable him to grow a garden and perhaps a few acres of field products on his claim, but mainly his dependence must be upon utilizing the natural sparse growth of grass." Such lands are excluded from homesteading as may be reasonably practicable for irrigation by means of water conducted from natural streams, under the national irrigation law, or by private enterprise, particularly along the North Platte River. The old 160-acre homestead, as originally planned, had serious natural drawbacks on the Great Plains. These were the semi-arid conditions; the impossibility of reclaiming by irrigation on account of lack of water supply; the great elevation, ranging from 2000 feet at the eastern limit to 5000 feet or more at the western limit of the area, and being far above the level of streams.

In conclusion, we may say of the sod house:

(1) It may be a home in every sense of the word; not a hovel or a sign of poverty.

(2) It is the expression of a natural response to a physiographic region.

(3) The study of it as such furnishes a concrete approach to the physical geography of the region.

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LITTLE HOLLAND

By Nell G. Hudson, Madison, Wis.

HOLLAND—"A land without mountain, rock or spring." A land of constant warfare where the weaker has been victorious—A never ending conflict between ocean and man. Neptune, not accustomed to defeat, is constantly seeking points of attack. Some battles he wins as in the thirteenth century when he overwhelmed seventy villages and took one hundred thousand lives for toll. The courage and perseverance of this little nation won, and the Old Man of the Sea retreated, growling, to his fortress.

The waves built sandbars, and later such material was built into sand dunes by the wind. These were taken advantage of by the Dutch as a fit foundation for entrenchments against the common enemy. Hence they were reinforced and added to until at the present time she has sixteen hundred miles of such embankments or dikes, including two of the largest dikes in the world. Since her very existence depends on the efficiency of these ramparts, she keeps an army of engineers constantly at work reconstructing, improving, building and watching for the least sign of weakness. This takes money and a great deal of it but the people furnish it without a murmur.

"By nature the country is a mudhole; by genius, energy, patience and faith of a noble people it has been changed into a garden."

Most English-speaking people mean the Netherlands when they say Holland. In reality Holland is only one of the eleven provinces that make up that kingdom. The whole country is about as large as South Carolina.

The country has two great natural advantages—good soil and an excellent position. Most of its soil has been transported; it is made up chiefly of sand, clay and organic mold, which the Rhine has brought from the Alps. This land surface is in general so low that it has to be drained. One third is below sea level. There is a regular network of drainage ditches. These, besides draining the land, serve in place of fences and act as roadways. It is said that there are 5000 miles of navigable waterways made up of rivers and canals, and taking up one fourth of the surface of the country.

Agriculture is the foremost industry of the little kingdom. They raise many things but are noted for bulbs, flowers and dairy products. Their scientific and even affectionate care of their cows is noted the world over.

Great Commercial Interests of Holland

It is distinctly a commercial country. This is due to several reasons, among which are transportation, geographical position, valuable colonies and character of the people.

The prime purpose of ditches in Holland is for drainage, but thrifty people saw that they could be used for water transport while their embankments were fitted for roads and railways. Therefore no part of Holland is without ready access to markets and it is known as the "Land of Traders."

This little kingdom is the commercial key to northern Europe. It controls the mouth of the Rhine which is the commercial river of Germany. It is right in the path of trade between central Europe, America, and England.

The constant association of this people with the sea made them expert sailors. In the 17th century she was the first sea power. Hence in the discovery of new lands she took her part. In colonization she was most successful in the East Indies, although she has a foothold in northern South America yet. Today she trades heavily with these possessions and next to England has been most successful in her colonial schemes.

A Liberty-loving, Prosperous People

"Resolute, serious, vigilant, these people love intensely their cold, wet land. They have made the home beautiful and were the first to glorify it in art." Their dwellings are models of neatness. Tumbled down houses and latchless gates are unknown. It is a land where pauperism and crime scarcely exist. Thrift and economy prevail, with plenty for the rainy day.

Their very existence has been one of warfare with man on one hand and the ocean on the other. Her history is filled with change. At one time they were under the rule of Germany, then Spain, during which time they secured independence; they maintained a republic for two hundred fifty years and now a limited monarchy. Their sufferings made them sympathetic, broad-minded and independent.

People of advanced ideas sought refuge with them. The Pilgrims from England, the Huguenots from France, Germans and down-trodden people from anywhere, all came, sure of a welcome. These wanderers, in many instances, brought ways of doing things that were new and they gave the best they had to their benefactors. The Dutch took advantage of this opportunity and developed their manufacturing industries to a great extent. At present these stand next to agriculture.

Their largest city is Amsterdam, about the size of Baltimore. A canal connects it with the North Sea. The great seaport, however, is Rotterdam. It is situated near the mouth of the Rhine and is the terminus of many steamships from New York and elsewhere.

THE JOURNAL OF GEOGRAPHY INDEXED IN "THE READERS' GUIDE SUPPLEMENT."

As most users of libraries know, Poole's Index to Periodical Literature has been replaced by a similar publication, "The Readers' Guide" and "The Readers' Guide Supplement." The former is devoted mainly to the general magazines, while the Supplement is devoted to special magazines. The Journal of Geography belongs to the latter class and is indexed regularly in the Readers' Guide Supplement. This should be found in all of the larger public libraries and college libraries.

A NEGLECTED SOURCE OF GEOGRAPHICAL INFORMATION

Roland M. Harper
College Point, N. Y.

FOR years, especially since the invention of the half-tone process about three decades ago, it has been customary for railroads, hotels, land companies, boards of trade, cities, counties, etc., particularly in those parts of the world most frequented by tourists or where the population is increasing fastest, to publish for gratuitous distribution pamphlets and even books describing the resources and attractions of their respective regions. Many of these are beautifully printed, lavishly illustrated, and full of interesting geographical information; but comparatively few of them ever find their way to library shelves, for several reasons.

In the first place, many of them are of such odd sizes or irregular shapes that they are not well adapted to stand on shelves or be filed or bound with pamphlets of the more common sizes. Second, they are distributed so sporadically (few of them being copyrighted and most of them not even advertised) that no one person or institution can hope to have anything like a complete collection; and the fact that they cost nothing also tends to make them unappreciated. Thus they are rarely mentioned in scientific literature, for a conscientious writer hesitates to cite a publication, however trustworthy it may be, which few of his readers can ever see. Third, the difficulty of citation is increased by the fact that most of these pamphlets are anonymous and undated, and thus lack a certain appearance of authenticity that they might otherwise have. Fourth, being intended for the general public, they are necessarily superficial or untechnical in treatment, which may cause them to be looked upon with disfavor by some scientists. Fifth, as the main object of such literature is advertising, it is naturally biased, with a tendency to exaggerate the advantages and minimize or ignore the disadvantages of the regions described. Even the illustrations are not always what they purport to be, unfortunately, for when one community publishes a good farming scene, for instance, others may borrow it later to illustrate their own resources.

Most of the above objections will apply also to newspaper clippings, which are collected by some people, including the writer, and are often worth many times the trouble it takes to cut them out and label them. For the irregular sizes and shapes there seems to be no simple remedy at present, but the other objections can be met more or less successfully.

As far as accessibility is concerned, persons living in the larger cities have a constant source of supply in the ticket offices of the various transportation companies. Dwellers in smaller places are less fortunate, but can get many valuable pamphlets at small expense through advertisements in magazines and newspapers. Expositions and fairs are another happy hunting ground for collectors of free geographical literature. At the two California expositions

last year the writer gathered about thirty pounds of this material, and then had to decline some fine large state handbooks because already overburdened. California of course was better represented there than any other state, most of its counties having pamphlets to distribute. Of the foreign countries Canada and Australia were probably the most liberal in this respect. One of Canada's offerings was a quarto atlas, with separate colored maps of each province and much descriptive matter.

To the prevailing condition of anonymity there are some notable exceptions. Most state handbooks contain the names of one or more persons responsible for their authorship, sometimes including men of more than local reputation; and the same is true of some booklets dealing with smaller areas. For example, one of the California counties had its booklet written and printed by Elbert Hubbard, apparently only a few weeks before his death. And where the date is not given on the title page of a pamphlet it can often be approximated within a year or two by means of statistics given within. If possessors of such pamphlets take the precaution to mark them promptly with the date of accession they will know in after years that they were published between that date and the latest events mentioned in them.

If the treatment is untechnical it is not necessarily inaccurate, and is better adapted than a scientific treatise would be to students of the ages at which geography is commonly studied. As far as accuracy is concerned, the present standard for free geographical literature, with the possible exception of that issued by land companies, is higher than one might suppose without investigation. Many of the statements in these advertising pamphlets relate to facts which there would hardly be any motive for misrepresenting, or which can easily be verified in these days of rapid dissemination of knowledge. Even some state supplements to school geographies published during the present century are more extravagant, and even inaccurate, in describing the advantages of their respective regions, and say less of the disadvantages, than some of the literature here discussed. As regards the pamphlets collected in the West last year, the writer found no serious misstatements in any dealing with regions traversed on the trip. Not only that, but good use was made of several of them, especially during the weeks spent "on the road" without access to libraries, in revising state descriptions for an encyclopaedia then in course of publication.

It may be appropriate to mention briefly some of the choicest bits of free geographical literature acquired in preparation for, or in the course of, a trip to California and return. The Southern Pacific and Western Pacific railroads both issued for the benefit of travelers from the East descriptive folders, telling briefly what was to be seen around and between almost every station on their main lines, as well as such data as distance, altitude, and population. For the traveler who wished to spend all his time between stations in studying the landscape these answered about as well as the much more bulky and expensive transcontinental guide-books published by the U. S. Geological Survey (which came out too late in the summer to be of the greatest service anyway,

and then did not cover either of the two routes named, which in some ways are the most interesting of all). The Southern Pacific also gave out a large folded map of San Francisco, on the back of which was found almost all the information that a stranger could ask for; and there were similar maps of California and Nevada, with good general descriptions of those states. All of these are probably still to be had for the asking, and they should be a valuable aid to the study of geography in our schools.

GEOGRAPHY AT THE UNIVERSITY OF MICHIGAN

WITH the opening of the academic year 1915-16, geography work has been formally added to the work in geology at the University of Michigan, the name of the department being changed to that of Geology and Geography. Geography has also been made one of the subjects open to election by freshmen in the Department of Literature, Science and the Arts, and continues through the year four times weekly, the work of the first semester being devoted to physiography, and that of the second semester to anthropogeography. The work in physiography is conducted as heretofore by Assistant Professor Irving D. Scott, and the geography work by Carl Ortwin Sauer (Ph.D., University of Chicago). About 150 students have been enrolled in the freshman course, and an elective course in commercial geography given during the present semester has been elected by 115 students, showing plainly the need for such training at the university.

During the summer session of the university there will be included geography work in charge of Dr. Sauer, and in the next academic year in addition to the course in commercial geography, courses in the Geography of North America, and Geographic Influences in American History will be offered.

During the present year the following illustrated lectures by non-resident lecturers were delivered to popular audiences in the new auditorium of the Natural Science Building.

Program of Lectures

November 11—Miss Dora Keen, *Philadelphia,*
"The First Ascent of Mount Blackburn"
December 2-3—Dr. Ellsworth Huntingdon, *Milton, Mass.,*
"Weather, Work and Human Activity"
"The Ideal Climate and the Distribution of Civilization"
"The Past Distribution and the Cause of Climatic Changes"
February 24-25—Professor R. H. Whitbeck, *University of Wisconsin,*
"Some Geographical Influences upon the Trend of Civilization"
"The Reclamation of Desert Lands"
March 10—Professor Walter S. Tower, *University of Chicago,*
"Northern Chile and the Nitrate Industry"
A Journey through Argentina"

March 31—Miss Ellen Churchill Semple, *Louisville, Ky.*
"The Barrier Boundaries of the Mediterranean in the Present War"
"Geographic Influences in Japan"

April 21—Professor J. Russell Smith, *University of Pennsylvania,*
"Tree Crops and Conservation"
"The Desert and the Desert's Edge"

May 4-5—Dr. Edward L. Stevenson, *Secretary,* The Hispanic Society, *New York City,*
"The Expansion of Geographic Knowledge in the Middle Ages and its Record as given by the Map-makers,
"Early Discovery and Exploration in the New World as Represented by Contemporaneous Map-makers." W. H. H.

GEOGRAPHY EQUIPMENT AT DENISON UNIVERSITY

TWENTY-FIVE miles northeast of Columbus, Ohio, is the village of Granville. In this village is one of Ohio's 42 colleges and universities; it is Denison University, with 500 students. Conspicuous among the college buildings is a particularly attractive new building, *Science Hall.* One floor of this is devoted to geology and geography, mainly the latter, and is presided over by Professor Frank Carney.

Considering how recently geography has risen to the dignity of a university study in America, one does not expect to find in a little college like Denison a well developed and excellently equipped department of geography. Yet this institution has such a department, furnished and equipped in a way that would do credit to a much larger institution. When you enter the building and note its floors of ornamental tile, base-boards of white marble, bannisters of ornamental iron-work, and wood work of quarter-sawed white oak, you feel that somebody appreciated the educational value of bringing students into touch with things of good quality and good taste.

When Professor Carney came to Denison 12 years ago the institution had no equipment for teaching college geography. During these years he has brought together an excellent equipment. The lantern slide collection numbers 6000, largely made in the department. Both lecture room and laboratory have specially designed frames projecting from the wall, holding some 30 or 40 maps mounted on spring rollers. Cases are provided for storing ordinary roller maps in vertical position. Counters with dust proof drawers store U. S. Geological Survey sheets and folios. The departmental library is large and light; the books in glass-doored cases, and all well indexed. There is a dark room, map mounting and work rooms, office and store rooms, and a large collection of relief models. The equipment, not including furniture or cases, has cost about $12,000.

SUMMER COURSES IN GEOGRAPHY

By F. E. Williams
University of Wisconsin, Madison

University of California, Berkeley

In Introduction to College Physiography, Mr. Vander Eike.

Physical Geography in the High School, Mr. Vander Eike.

Field Course in Physiography, A Field Study of the Mount Whitney Region, Dr. Buwalda.

Economic Geography, Mr. Barnhart.

University of Chicago

Economic and Commercial Geography, Associate Professor Goode.

Geography of North America, Miss Lanier.

Elementary Field Course, Four weeks in southwestern Wisconsin, commencing June 19, Assistant Professor Jones.

Field Course: The Environs of Chicago, Second Term, Assistant Professor Jones or Mr. Taylor.

Political Geography, Associate Professor Tower.

Influence of Geography on American History, Miss Lanier.

Economic Geography of the United States, Associate Professor Goode.

Geography of South America, Associate Professor Tower.

Principles of Geography, First Term, Professor Whitbeck.

Geography in High Schools, First Term, Professor Whitbeck.

Field Geography, Region between Montreal and Halifax, Sept. 2nd for four weeks, Associate Professor Tower.

The School of Education of Chicago University offers courses in:

Geography in the Primary Grades: Home and World Geography, Associate Professor Baber.

Geography in the Grammar Grades: North America, Associate Professor Baber.

Geography in High Schools, First Term, Professor Whitbeck.

Cleveland School of Education, Cleveland, Ohio

Methods in Elementary Geography and Local Field Studies, Mr. Gregory.

Industrial Geography and Studies of Cleveland's Industries, Mr. Gregory.

University of Colorado, Boulder

Principles of Earth Science, Professor McCourt.

Field Geology, Professor McCourt.

Geographic Influences, Professor McCourt.

Climatology, Professor McCourt.

Geographic and Geologic Excursion, Aug. 5th to Aug. 29th to interesting places in Colorado, Utah, and Wyoming, Professor McCourt.

Columbia University, New York, N. Y.

Physical Geography and its Economic Aspects, Professor Johnson and Mr. Lobeck.

Physiography of the Eastern United States, Professor Johnson.

Field Work in Physiography, Professor Johnson and Mr. Lobeck.

Commercial Geography, Professor McFarlane.

Geography of Industry and Trade, Professor McFarlane.

Geography of Europe with Special Reference to the European War, Professor Johnson.

Geographic Delineation and Map Interpretation, Mr. Lobeck.

Mathematical Geography, Professor Jacoby.

The School of Education of Columbia University offers courses in:

The Teaching of Geography in the Lower Grades, Miss Kirchwey.

The Teaching of Geography in the Upper Grades, Miss Kirchwey.

The Teaching of Regional Geography in the Junior High School, Miss Kirchwey.

Continental Geography for Elementary Schools, Miss Kirchwey.

Cornell University, Ithaca, N. Y.

Physical Geography, Assistant Professor von Engeln.

Commercial and Industrial Geography, Assistant Professor von Engeln.

Physical Geography, Laboratory course, Mr. Elston.

Geography and Geology, Field Course and Excursions, Assistant Professor von Engeln and Assistants.

Denison University, Granville, Ohio

Teachers' Course in Geography, Professor Carney.

Industrial Geography, Professor Carney.

Geography of South America, Professor Asensio.

Round Table Conferences, Professor Carney.

Harvard University, Cambridge, Mass.

Physiographic Field Studies, Professors Woodworth and Wolff.

Field Geology, course in San Juan Mountains of Southwestern Colorado, eight weeks, Professor Atwood and Dr. Haynes.

Physiographic Field Studies, Professor Atwood.

Indiana University, Bloomington

Conservation of Natural Resources, Professor Cumings.

Advanced Field Work, Associate Professor Beede.

The School of Education of Indiana University offers courses in:

Teaching of Geography, Assistant Professor Williams.

Economic Geography, Assistant Professor Williams.

Relation of Geography to American History, Assistant Professor Williams.

UNIVERSITY OF IOWA, IOWA CITY

Physical Geography, four weeks, Assistant Professor Thomas.
Physical Geography, six weeks, Professor Trowbridge and Mr. Shipton.
Field Geology, Baraboo district, Wisconsin, Professor Trowbridge and Dr. Stephenson.

UNIVERSITY OF KANSAS, LAWRENCE

Physiography, Professor Haworth.

UNIVERSITY OF MICHIGAN, ANN ARBOR

Teachers' Course in Physiography, Dr. Sauer.
Geographic Influences, Dr. Sauer.
Commercial Geography, Dr. Sauer.

UNIVERSITY OF MINNESOTA, MINNEAPOLIS

Physiography, Assistant Professor Posey.
Geography of North America, Assistant Professor Posey.
Teachers' Course in Geography, Assistant Professor Posey.
Field Courses in Geography (4 tours), Assistant Professor Lehnerts.

UNIVERSITY OF MISSOURI, COLUMBIA

Teachers' Geography, Mr. Parkins and Mr. Thomas.
Fundamentals of Physical and Human Geography, Mr. Parkins.
Geographic Influences in American History, Mr. Parkins.
Geographical Excursion, Mississippi River and Great Lakes, Mr. Parkins.
Field Course in the Wind River Mountains of Wyoming, June 12th to Aug. 2nd, Mr. Branson, Mr. Griley.

UNIVERSITY OF NEBRASKA, LINCOLN

Physical Geography, Associate Professor Bengtson.
Industrial Geography, Associate Professor Bengtson.
Geography of Nebraska, Associate Professor Bengtson.

UNIVERSITY OF NORTH CAROLINA, CHAPEL HILL

The Teaching of Geography, Mr. Noble.
General Geography, Mr. Smith.
High School Geography, Mr. Smith.
Elementary Geography, Mr. Smith.

UNIVERSITY OF NORTH DAKOTA, GRAND FORKS

Physiography, Mr. Simpson.
Field Geography and Physiography, Mr. Simpson.
The Summer Courses in Geology and Physiography are given at Devil's Lake.

OBERLIN COLLEGE, OBERLIN, O.

Field Geology, Southern Vermont, Professor Hubbard .

OHIO UNIVERSITY, ATHENS

Physical Geography, Professor Thompson.
Political Geography, Professor Thompson.

GEORGE PEABODY COLLEGE FOR TEACHERS, NASHVILLE, TENN.

Elements and Principles of Geography, Section I, Mr. Colby; Section II, Miss Dopp.
Commercial Geography, Mr. Colby.
Geography, Peoples, and Commerce of South America, Mr. Colby.
Influence of Geography on American History, Miss Dopp.

UNIVERSITY OF PENNSYLVANIA, PHILADELPHIA

Commercial Geography of United States, Assistant Professor Roorbach.
Climate and its Economic Influences, Assistant Professor Roorbach.
Resources and Industries of South America, Assistant Professor Roorbach.

SUMMER SCHOOL OF THE SOUTH, KNOXVILLE, TENN.

Home and World Geography, Miss Henderson.
North America, Miss Henderson.
Physical and Commercial Geography, Miss Henderson.

UNIVERSITY OF VIRGINIA, CHARLOTTSVILLE.

Physical Geography, Miss Kelley.
Industrial Geography, Miss Kelley.
Aims and Methods in Geography, Miss Kelley.

UNIVERSITY OF WASHINGTON, SEATTLE

Physical and Regional Geography, Professor Landes.
Traveling Course, includes Glacier National and Yellowstone Parks, Assistant Professor Saunders.

UNIVERSITY OF WISCONSIN, MADISON

Physical Geography, Assistant Professor Steidtmann.
*Geography of South America, Assistant Professor Finch.
*Agricultural Geography, Assistant Professor Finch.
Commercial Geography, Associate Professor Martin.
*Geography of Wisconsin, Associate Professor Martin.
*Glaciers and Glaciation, Associate Professor Martin.
*Field Course in Physiography and Geology at Devils Lake, Wisconsin, Four Weeks in August, Associate Professor Martin.
*May be taken for credit toward an advanced degree.

The foregoing list is incomplete. An effort was made to secure information from all of the larger universities and many of the smaller ones. Many did not respond to our inquiries and others did not send details regarding courses. Many normal schools give summer courses in geography.

MORE STATES ORGANIZE BRANCHES OF THE NATIONAL COUNCIL OF GEOGRAPHY TEACHERS

OHIO. At the annual meeting of the Ohio Teachers of Science and Mathematics held in Columbus April 22nd, an Ohio State Council of Geography Teachers was organized. Marked enthusiasm attended the launching of the organization. Prof. Frank Carney of Denison University was elected president, and Prof. Wm. H. Holt of the Bowling Green Normal School was elected secretary and treasurer. The meeting passed a resolution authorizing the officers elected to divide the state into districts and select a vice-president for each district. Later it was decided to adopt the five divisions of the state recognized by the State Teachers Association, namely, a northeast, a northwest, a southeast, a southwest, and a central district. Each of these districts holds a Teachers Association annually. The State Council will probably carry on the local work through the vice-presidents of these districts. There is evidence that Ohio will have one of the strong and enthusiastic Councils.

Kentucky also organized a State Council in April. Miss Elizabeth Beckenbridge of the Louisville Normal School writes as follows regarding the organization: "Our State Educational Association met at Louisville last week and our Geography Department had its meeting Thursday afternoon in one of the assembly rooms of the principal hotel. Though it poured down rain the whole afternoon, both the room and the hall around the doors were crowded. I do not believe it would be an exaggeration to say that 200 people stood throughout the entire program. The three papers were excellent, but the part that pleased me especially was the interest taken in the round-table discussion following the papers. The motion was passed that the Chairman, Mr. R. P. Green, be given the power to divide the state into districts and appoint a leader for each district, the leader to be made responsible for 'getting certain things done in his district.' All of our newspapers are exceedingly kind about publishing announcements of our meeting."

Professor R. P. Green of the Bowling Green Normal School writes concerning this meeting: "A great deal of interest was manifested in the work and I am sure that you will hear good reports from Kentucky. We are planning to take up the work by Congressional districts and then by counties. A committee will be appointed to study our problems in Kentucky and carry out any suggestions that the council may wish to make."

Professor Green was elected president of the State Council and Miss Kalert of the Louisville Normal School, secretary.

RECENT PUBLICATIONS

ELEMENTARY GEOGRAPHY. VII+360 pp. ADVANCED GEOGRAPHY, VII+439 pp. Hinds, Noble & Eldredge, New York, 1915. 75c and $1.10 postpaid.

The first impression one receives on examining the first book is that it is unusually large for an Elementary Geography. It contains almost as many pages as the ordinary advanced geography. There are 357 figures, and 30 maps.

The difficult matter of map scale has been met by the adoption of three scales only. All the continents except Europe are drawn to the same scale. The United States, Canada, Mexico, and Europe have the same scale, and the different groups of states of the United States are all drawn to a third scale. This avoids the common difficulty of making Maine appear larger than Illinois, and Colorado about half the size of Ohio.

The abundance of material, the numerous illustrations, and the easy familiar style make the book attractive to children. Mechanically, the book is strongly bound in cloth to withstand the wear and tear that books for the grades are sure to receive.

HERBERT BASSETT.

"THE PHYSICAL GEOGRAPHY OF WISCONSIN" (to be reviewed later) is a new educational bulletin of the Wisconsin Geological and Natural History Survey by Lawrence Martin. The book contains 550 pages, illustrated by 206 text figures and 41 plates, including photographs and colored contour maps. A relief model of Wisconsin appears in the volume as a folded map. The volume contains 18 chapters and 8 appendices. Two chapters are devoted to the state as a whole and to its physiographic provinces, 6 chapters to the Western Upland, including Driftless Area, Mississippi River, etc., 4 chapters to the Eastern Ridges and Lowlands, and 2 chapters each to the Central Plain, Northern Highland, and Lake Superior Lowland. Teachers may obtain copies of this book without charge by writing the State Geologist, Madison, Wis., and enclosing 15 cents for postage.

STUDENT'S MANUAL OF PHYSICAL, ECONOMIC AND REGIONAL GEOGRAPHY. By Charles R. Dryer and James A. Price. 171 pp. American Book Co., New York, 1916.

This new laboratory or exercise manual for high schools is of the loose-leaf type. It is designed to be used in schools where but a short time is devoted to the study of geography.

A large portion of the manual is based on illustrations and statistics in Dryer's High School Geography and has 21 of the 57 exercises devoted to studies of the production and the distribution of the world's crops and minerals. The other exercises are in the field of mathematical geography, map construction, regional studies, climate and weather, ocean currents, soils, and commerce. The question method, generally adopted in similar books, is

used for the most part. Some of the lessons require observation and cover a portion of the work usually included in earth science.

The most important advantage of the work is that it can be used without laboratory equipment other than Dryer's High School Geography. This feature should appeal to teachers in the smaller high schools, which generally lack equipment, and to those teachers who are required to divide their teaching time between geography and other subjects. The plan of reenforcing the study of the printed text by a series of practical exercises will commend itself very generally to teachers. The number of exercises (57) is large enough to allow teachers to select those which appeal to them and to omit others.

F. E. WILLIAMS.

GEOLOGY, PHYSICAL AND HISTORICAL. By H. F. Cleland. American Book Co., New York, 1916. 718 pp.

Cleland's Geology is an advanced textbook in whose "section on physical geology the human relation has been emphasized whenever possible, while in the historical section the history of life from the evolutionist's point of view has been taken up in broad outline." The book has twenty-two chapters, ten devoted to historical geology, and the remainder to physical geology. The last-named section, which naturally appears first in the book, discusses the usual topics of elementary geology—weathering, the work of wind, ground water, streams, glaciers, the ocean, followed by the structure of the earth, earthquakes, volcanoes and igneous intrusions, metamorphism, mountains and plateaus, and ore deposits. The text is simple, comprehensive, and up-to-date. The illustrations are uniformly good, especially the block diagrams. Teachers of physical geography will find this book useful as a reference work, for, although the point of view is different, the topics of the section on physical geology are much the same as those of physiography. As a successful teacher the author has presented the subject clearly and interestingly. The book is decidedly creditable to American geology.

LAWRENCE MARTIN.

The Illinois Geological Survey has just issued Bulletin No. 26, GEOLOGY AND GEOGRAPHY OF THE GALENA AND ELIZABETH QUADRANGLES, by A. C. Trowbridge, Eugene W. Shaw and B. H. Schoekel; cloth, 233 pp., 25 plates, 50 figures, 2 folded maps. The several chapters deal with General topography, Geologic principles, Geology of the Galena and Elizabeth quadrangles, Glacial geology, Effect of wind, Work of ground water, Work of streams, Economic geology, Settlement and development of o Daviess County. To be reviewed later.

The American Book Company has recently issued its new two-book series of Elementary School Geographies by Professors Brigham and McFarlane. The books reached us too late for review in this issue.

HOME GEOGRAPHY, A TEXT-BOOK FOR PUPILS, BASED ON THE ILLINOIS STATE COURSES OF STUDY, by Douglas C. Ridgley and Laura M. Eyestone. Published by McKnight and McKnight, Normal, Ill.

The authors of this book say in their preface, "This book is prepared with the express purpose of furnishing definite, concrete materials and directions to pupils and teachers for the study of Home Geography as outlined in the Course of Study for the Common Schools of Illinois." Blank pages are inserted for drawings and pictures, outlines are given for observations of the weather, the sun, moon, etc., lists of trees, birds, and wild flowers. Many questions are asked to be answered by pupils from their own observations.

Anyone who is teaching lower grade geography will find many helpful suggestions in this book. HERBERT BASSETT.

NOTES FROM "GEOGRAPHY AND WORLD POWER"*

COAL. "It has been calculated that the coal used in our factories alone, all other uses whatsoever being excluded, gives the equivalent of the energy of 175,000,000 hard working men, and in such a useful form as men could never supply. The power of Greece, whereby she achieved such great things in all directions of human progress, was largely based in the first instance on the work done by the servile class. On the average each Greek freeman, each Greek family, had five helots whom we think of not at all when we speak of the Greeks, and yet these were the men who supplied a great part of the Greek energy. In Britain, we may say, every family has more than twenty helots to supply energy, requiring no food and feeling nothing of the wear and tear and hopelessness of a servile life. With a population of 45 million men, women and children, Britain's factories are worked by 175 million man-power. Her railways and steamships use 90 million man-power more. In comparison with the energy supplied to machines in which things are made to move by purely mechanical means, the physical energy supplied by the fewer than 20 million men and women scarcely count. We have become a nation of engineers, pressing buttons and pulling levers, oiling and packing, so that the great social machine will work smoothly and as easily as possible."

The United States. "Here, then, is the United States taking its place in the circle of lands, a new *orbis terrarum,* and yet outside that which has hitherto mattered, compact and coherent, with enormous stores of energy, facing Atlantic and Pacific, having relations with east and west of Euro-Asia, preparing by a fortified Panama Canal to fling her one fleet into either ocean, and attempting to secure the approaches to that Canal by the formulation of a Monroe doctrine which forbids control of any lands of the New World by Powers of the Old, but is effective at present only in those small and comparatively unimportant states lying round the seas through which vessels using the Panama Canal would pass.

*By James Fairgrieve; reviewed in the Journal of Geography, April, 1916, p. 308.

"Here, unlike the disunited states of Europe, in which men speak many languages and remember that through the long past years they have been at enmity, we have a vast land where people speak one language, with no long history of discord behind them—THE UNITED STATES."

NOTES FROM HUNTINGTON'S "CIVILIZATION AND CLIMATE"

"MENTAL activity reaches a maximum when the outside temperature averages about 38 degrees, that is, when there are mild frosts at night. Another highly important climatic condition is the change of temperature from one day to the next. People do not work well when the temperature remains constant. Great changes are also unfavorable. The ideal conditions are moderate changes, especially a cooling of the air at frequent intervals."

"Today a certain peculiar type of climate prevails wherever civilization is high. In the past the same type seems to have prevailed wherever a great civilization arose. Therefore, such a climate seems to be a necessary condition of great progress. It is not the cause of civilization, for that lies infinitely deeper. Nor is it the only, or the most important condition."

"It is notoriously true that in India there is almost no such thing as a fourth generation of Indian-born British. The original stock is so weakened by tropical conditions that the children must either be sent back to Europe to recover their health, or else they are enfeebled and their descendants soon die out."

"There can be little doubt that malaria, and the many other diseases which are characteristic of tropical countries, play an important part in causing a low state of civilization."

"Most of us think that in the northern United States we work fast in winter. As a matter of fact, the statistics of ten thousand people show that we work slowly. The ordinary impression is apparently psychological. In order to keep warm out of doors in winter we walk fast and this leads us to think that we do everything rapidly."

"The actual figures show that, taking the year as a whole, on dull days, especially the second such day when a storm begins to clear, we accomplish more than on bright days."

"Taking the year as a whole, uniformity of temperature causes low energy, a slight rise is beneficial, but a further rise is of no particular value, the beginning of a fall of temperature is harmful, but when the fall becomes a little larger it is much more stimulating than rise, when it becomes extreme, however, its beneficial qualities begin to decline."

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